

Solar power A sunrise sector

India, which will rank among the four top generators of solar energy in a few years, is also a major producer and exporter of solar panels. Huge investments are being made in new manufacturing units across the country, notes **Annamma Oommen**.

The planet's hunger for energy is growing by the day, even as tens of millions of citizens in the developing world acquire air-conditioners, refrigerators and cars, using up more electricity and non-renewable forms of energy.

Even as the world's need for more energy grows, the fact remains that alternative sources of energy contribute to barely one per cent of overall consumption. Solar energy, which is perhaps the most reliable – and easily exploitable – source of non-conventional energy, contributes even lesser.

However, the scenario is 'brightening' rapidly. Currently, solar installations around the world add up to about 3 GW (gigawatt) of power, and are projected to double by 2010. Global sales of solar installations are expected to touch \$65 billion by 2013, from just \$16 billion in 2006.

Solar power can be generated through different technologies like crystalline silicon wafers and photo-voltaic (PV) cells.

HERE COMES THE SUN

Solar energy is today one of the 'hottest' sectors for investors looking for opportunities in India. Billions of dollars in investments are expected to materialise over the coming months, as top Indian business groups unveil ambitious plans for a sector that is glowing red-hot. The Indian government, which unveiled its semiconductor policy last year, announced a special incentive package for potential investors in technologies that will help generate solar energy.

The government has received seven proposals adding up to investments of about \$16 billion to set up manufacturing units for poly-silicon, single and multi-crystalline ingots, wafers, solar cells, photo-voltaic modules, etc.

Reliance Industries has submitted a plan to set up two manufacturing facilities – for semiconductors and poly-silicon, both used for making solar

panels – with a total investment of about \$7.5 billion. The group plans to set up the poly-silicon, solar-grade wafers and solar PV modules factory (at a cost of about \$2.9 billion) in Jamnagar in Gujarat, where it already has a refinery.

The other plant will be a semiconductor fabrication unit with assembly, test, mark and packaging (ATMP) facility and would be built at a cost of over \$4.6 billion. Reliance Industries has ambitious plans for the sunrise sector. It is planning to set up a 10 MW solar facility in West Bengal. State-owned Bharat Heavy Electricals Ltd is also keen on a joint venture with Reliance for setting up solar fabrication units.

Half a dozen other companies, including Videcon Industries (\$2 billion investment envisaged), Moser Baer PV Technologies (\$1.5 billion), Titan Energy System (\$1.47 billion) and KSK Energy

Ventures (\$800 million) have submitted proposals to the government. Another energy major, Lanco Infratech of Hyderabad, is also planning a foray into the solar energy sector. According to L. Madhusudan Rao, chairman, Lanco Infratech, the company plans to set up an end-to-end solar complex in Chennai, and is keen to invest across the board in various solar technologies.

The Indian government is offering incentives, including financial subsidies and equity participation adding up to 20 per cent of capital expenditure in the first 10 years – for projects in special economic zones (SEZ) – and 25 per cent in non-SEZ areas.

Indeed, there is an unprecedented rush to tap solar energy as investors formulate projects to manufacture components that would help generate much-needed power for an energy-starved world.



ENORMOUS OPPORTUNITIES: The government has received proposals worth \$16 billion in the solar energy sector

The former is more popular as it is considered much more efficient compared to thin film PV cells and even CIGS (copper, indium, gallium, selenide) cells, as crystalline silicon wafers produce an efficiency level of 24 per cent under test/laboratory conditions (about 16 per cent in the field).

For thin film, the efficiency is lower at 7 per cent in the field, which is why crystalline silicon accounts for 90 per cent of the market. This also makes the cost of generating electricity through solar power more expensive due to the limited availability of crystalline silicon (energy from wind and biomass is cheaper). However, a combination of scale and technological innovations are bringing production costs closer to those of conventional energy.

An entrepreneur investing in solar technology, who can put things in the right perspective, is Prabhu Goel, chairman of Signet Solar, California, who has invested \$2 billion in India's solar energy industry.

According to Goel, the market for

solar energy in India is less than 100 MW; energy currently produced here costs a whopping 22 cents a kilowatt, which is 'peak power cost.' "We are working on bringing this cost of generation down to 10 cents, which is at par with the cost of 'back-up power' obtained from a generator that runs on kerosene oil," he explains. "We expect to achieve this in the current financial year."

By 2011-12, advanced technology should help Signet lower the cost of production to about five cents a unit, which is the current grid power cost.

Started as early as the 1970s, the Indian government's solar PV programme is one of the largest in the world. Major players include public sector companies like Central Electronics Ltd, Bharat Heavy Electricals Ltd (BHEL) and Rajasthan Electronics and Instruments Ltd (REIL).

The Union Ministry of New and Renewable Energy (MNRE) is targeting an additional 14,000 MW power through renewable resources (including solar

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WHAT-A HEATER: About 2.15 million sq m of collector area has been installed in India for solar water heating applications

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power) by the end of the Eleventh Five-Year Plan (2012). About \$150 million has been allocated for research, design and development in the energy sector in the 11th Five Year Plan, as compared to less than \$20 million in the previous plan.

The Ministry has also given financial support to about 600 R&D projects in this sector. Other initiatives include development of 'solar cities' and demonstration programme on MW-size Grid Solar Power Generation. The government plans to identify 60 'solar cities' and extend financial assistance to reduce dependence on conventional energy.

According to latest data, 33 grid interactive solar PV power plants have been installed in India with financial support from the government. These plants, with a total capacity of 2.12 MW, are projected to generate about 2.55 million units of electricity annually. Other than this, 1.45 million off-the-grid solar PV systems, comprising 125-MW capacity, have been installed, leading to a prospective 150 million units per year. Another 2.15 million square metre of collector area has been installed for solar water heating applications.

Even state governments are taking keen interest in the development of alternative energy sources with focus on solar power. The MNRE promoted deployment

of nine solar energy plants in six states during 2007-08. Maharashtra tops the list with three plants, with Jammu & Kashmir at two. Other states with one each include Chhattisgarh, Haryana, Orissa and West Bengal.

The Ministry has also announced a new programme designed to expand solar power generating projects up to a maximum capacity of 50 MW and various sops and incentives have also been offered for the private sector. For example, entrepreneurs who build, own and operate solar projects will be offered financial incentives of about 30 cents for each kilowatt of solar power generated per hour.

Incentives for thermal power fed to power grids would be slightly lesser. Research and development is also being encouraged to improve their performance and reduce the consumption of materials. Interest subsidy is being provided on soft loans to users and manufacturers. Concessional or nil import duty on some of the raw materials, components and products is also being offered along with excise duty exemption and 80-100 per cent accelerated depreciation in the first year.

India currently has 19 manufacturers of solar PV modules, and substantial new

investments are in the offing. One of the biggest is the \$2 billion investment by Signet Power, in a project in Chennai over the next five years.

Signet Solar plans to target a production of one GW models by 2016. "Being located in the special economic zone (SEZ) at Sriperumbudur near Chennai, the plant will roll out products for exports, primarily for Europe and America," says Goel.

Later, the company would focus on the Asia-Pacific region. Initially it will manufacture modules for 60 MW plants. Signet's plans are primarily export-driven, unless it sees the domestic market evolving significantly. The plant is expected to be commissioned by the end of next year.

According to Vasudeva Rao, executive director, XL Telecom and Energy Ltd, a Hyderabad-based solar panel manufacturer, India is emerging as a major player in solar energy. Over the next two to three years, many Indian companies will be exporting solar energy panels to Europe, lured by the size of the market and the subsidies. Similarly, the Middle East also beckons Indian exporters.

Funding from private equity (PE) players could enable a big jump in solar installations. In light of the capital inten-



SOLAR CELL CHARGER: Huge amounts are being invested for research, design and development in the solar energy sector



MORNING TEA: Companies operating in the solar energy sector offer complete and customised solutions to customers

sive nature of solar projects, funding opportunities have been limited so far and private players have not been stepping into the sector. This could change if money is committed by PE and venture capital funds.

Moser Baer Photo Voltaic, a 100 per cent subsidiary of Moser Baer India, is also looking at solar power projects in Karnataka, West Bengal and Jammu and Kashmir. Other existing domestic private players looking to further expand their operations include Tata BP Solar, XL Telecom, WebelSL Solar and Titan.

Tata BP Solar, one of the early movers in the private sector, does not just produce solar modules, but offers complete and customised solutions. In addition to selling a solar street light module that costs \$260, the company also bundles batteries, automatic electronic switching systems, the pole and even installation and other services at a cost of \$540. Solar Semiconductor, which has offices in the US and

India, plans to expand manufacturing capacity from 50 MW to 200 MW through a billion-dollar investment.

Many of these investments are being made keeping in mind the lucrative markets of Europe and the US. Says Narender Surana, managing director, Surana Telecom and Power Ltd, Hyderabad: "Our diversification was based on the strong market potential for solar panels in markets in Germany and the US. The relative low-gestation project and high returns are one of the reasons for companies to enter this business."

Another Hyderabad-based company, Goldstone Infratech, has diversified into solar energy by planning to set up a 40MW/annum manufacturing facility. Of the 18 companies setting up plants across the nation, about half are coming up in and around Hyderabad, with some in the Fab City project, a state government-private sector initiative. Some of the players with a presence at Fab City include Titan Energy

Systems, Surana Ventures, Neotech Solutions and Nanotech Solutions. Nanotech is considering a thin solar cell fabrication project, which requires a substantially greater investment. There are several smaller companies that are operating in the 2-4 MW capacity, looking to scale up in the near future.

Overseas players like AES-Riverstone is also bullish on India. AES-Riverstone is a joint venture between US power major AES Corp and private equity firm Riverstone Holdings. Both AES and Riverstone plan to contribute \$500 million to set up AES Solar, and over the next five years will invest up to \$1 billion in PV solar projects around the world.

"We are watching developments in India and have the flexibility to move into the market if conditions warrant," says Ralph Alexander, managing director of New York-based Riverstone.

The future for the solar energy industry in India indeed looks promising.